REMARKS/ARGUMENTS

Claims 26-37, 40-42, 44-45, 47-48, and 60-69 are pending with entry of this amendment. Claims 1-25, 38-39, 43, 46 and 49-59 were previously cancelled without prejudice. Claims 67-69 are amended herein. These amendments introduce no new matter and support for the amendment is replete throughout the specification and claims as originally filed. These amendments are made without prejudice and are not to be construed as abandonment of the previously claimed subject matter, or agreement with any objection or rejection of record.

The amendments to claims 67 and 68 find support in the specification, e.g., at paragraphs 12, 26, 62, 80, and 84. The amendment to claim 69 finds support in the spec, e.g., at paragraphs 10 and 19.

I. Rejections Under 35 U.S.C. §103(a)

Claims 26-37, 41-42, 44-45, 47-48, and 60-68 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Han et al. (Nature Biotechnology, 2001) ("Han") in view of Kagan et al. (Phys Rev. Letts, 1996) ("Kagan"), in view of Takagahara (Surface Science, 1992) ("Takagahara"). Applicants respectfully submit that this combination of references relied upon by Examiner cannot support a *prima facie* case of obviousness at least because Han teaches away from such a combination and the proposed combination would change the principle of operation of the primary reference, Han.

With respect to independent **claim 26**, Examiner recognized that "Han et al. does not show any interactions between the optical properties of the plurality of sets of nanoparticles." (Office Action dated January 25, 2010, pg. 5) Examiner relied on Kagan to teach this limitation since Kagan describes **electron energy transfer** in CdSe quantum dots, and Examiner alleged that "coupling quantum dots as in Kagan et al. has advantages resulting the [*sic*] cooperative interactions to improve quantum mechanical properties of the system." (OA, pgs. 6-7) Examiner further relied on Takagahara, "which describes the 'merits,' results, and properties of the quantum dots that are changed (such as the exciton

coherence length; and **nonlinearity of emissions**) as a result of interactions between the particles." (OA, pg. 7)

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983); MPEP §2143.01(VI). Han explicitly teaches away from the combination suggested by Examiner. "[T]he embedded QDs have similar optical properties as free QDs, and the ratio of these two intensities is approximately equal to the number of QDs per bead. Significantly, these two independent measurements yielded nearly identical results, establishing a linear relationship between the measured fluorescence intensity and the number of embedded QDs (Fig. 3A). **This linear relationship further confirms the lack of fluorescence resonance energy transfer among the embedded QDs, a key requirement for multiplexed optical coding.**" (Emphasis added.)(Han, pg. 632, column 2) While Kagan demonstrates electronic energy transfer between close-packed quantum dot solids (Abstract), Han stresses the importance of preventing aggregation of the embedded QDs to prevent "spectral broadening, wavelength shifting, and energy transfer." Since Han clearly and explicitly teaches away from the "cooperative interactions" of Kagan relied upon by Examiner, the combination suggested by Examiner is improper. Further, since "the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, the teachings of the references are not sufficient to render the claims *prima facie* obvious." *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Han's optical coding system operates on the principle that there is no aggregation of QDs, and hence no fluorescence resonance energy transfer among the embedded QDs. (Han, pg. 632, column 2). Thus, changing this "key requirement" of Han, as proposed by Examiner, would change the principle of operation of Han. Such a modificaton is prohibited in making an obviousness rejection. MPEP §2143.01(VI). For at least the foregoing reasons, the rejected claims are not obvious in light of Han, Kagan, and Takagahara.

With respect to amended independent **claim 67**, neither Han, Kagan, nor Takagahara teaches a unique spectral code comprising one or more geometric shapes

formed by the emission of a nanocrystal subset, wherein the geometric shape corresponds to the configuration of the nanocrystal subset.

Claim 69 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Han as applied to claims 26-37, 41-42, 44-45, 47-48, and 60-66 above, in view of Chen et al. (Phys Rev. B, 2001) ("Chen"). To the extent this rejection is applied to the amended claims, Applicants respectfully disagree.

Examiner acknowledged that "Han et al. does not teach emissions and polarization angles." (OA, pg. 13) Examiner relied on Chen to teach the limitations of claim 69. Chen studies polarization spectroscopy of single CdSe quantum rods. (Abstract) As motivation for the combination of Han and Chen, Examiner asserted that "it is obvious to substitute known elements in the prior art to yield a predictable result," and "measuring by angle is an alternate form of assessing optical properties than [*sic*] measurement by wavelength or distance." (OA, pg. 11) To reject a claim based on the rationale that it is obvious to combine prior art elements according to known methods to yield predictable results, the Examiner "must articulate…(2) a finding that one of ordinary skill in the art could have combined the elements as claimed by known methods, and that **in combination, each element merely performs the same function as it does separately**; (3) a finding that **one of ordinary skill in the art would have recognized that the results of the combination were predictable**; and (4) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness." MPEP § 2143(A); *see also KSR International v. Teleflex*, 550 U.S. 398, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385-96 (2007). Applicants' amended independent claim 69 includes the limitation that "the spectral code comprises…one or more predetermined variations in at least one emission property of the population corresponding to multiple predetermined excitation polarization angles." The suggested combination of Han and Chen does not render amended claim 69 obvious at least because the elements do not perform in the same manner in combination as they do separately, and one of ordinary skill in the art would not have recognized that the results of the combination were predictable. For example,

Chen uses the polarization angles to study the properties of *single* quantum rods in a controlled system where the orientation of the rod is controlled. Quite differently, the QDs of Han are randomly embedded toward the outer quarter diameter of the polymer bead (pg. 632, columns 2-3), and the QDs change orientation in the assay as the polymer bead moves around in the assay and binds to an analyte. Thus, even if Han used "measuring by angle [as] an alternate form of assessing optical properties," as proposed by Examiner, the spectral code of Han could not include "predetermined variations in at least one emission property of the population corresponding to multiple predetermined excitation polarization angles" because the arrangement or orientation of the QDs in the polymer microbeads is unknown and the arrangement or orientation of the microbeads attached to the analytes is also unknown. This compounded uncertainty of the arrangement of the QDs in Han would not lead to predictable or repeatable emission properties corresponding to polarization angles such that the properties could be interpreted or repeated to create a meaningful biological tag. For at least the foregoing reasons, Applicants' claim 69 are not obvious in light of Han and Chen.

Claim 40 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Han in view of Kagan in view of Takagahara as applied to claims 26-37, 41-42, 44-45, 47-48, and 60-66 above, in view of Bruchez et al. (U.S. Patent 6,274,323) ("Bruchez"). As explained above in reference to independent claim 26, the combination of Han and Kagan is inappropriate. Since Bruchez does not teach the shortcomings of the primary references, dependent claim 40 is not obvious in light of Han, Kagan, Takagahara, and Bruchez.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the claims are deemed not to be in condition for allowance after consideration of this Response, a telephone interview with the Examiner is hereby requested. Please telephone the undersigned at (650)331-2209 to schedule an interview.

Respectfully submitted,

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